Abstract

Described is a modular, general synthetic strategy for the preparation in solution and on a solid support of heparin, heparin-like glycosaminoglycans, glycosaminoglycans and non-natural analogs of each of them. Additionally, the modular strategy provides the basis for the preparation of combinatorial libraries and parallel libraries of defined glycosaminoglycan oligosaccharides. The defined glycosaminoglycan structures may be used in high-throughput screening experiments to identify carbohydrate sequences that regulate a host of recognition and signal-transduction processes. The determination of specific sequences involved in receptor binding holds great promise for the development of molecular tools which will allow modulation of processes underlying viral entry, angiogenesis, kidney diseases and diseases of the central nervous system. Notably, the present invention enables the automated synthesis of glycosaminoglycans in much the same fashion that peptides and oligonucleotides are currently assembled.